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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/875,685	06/06/2001	Stuart James Rowen	6086	7535

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EXAMINER	
RUTHKOSKY, MARK	
ART UNIT	**PAPER NUMBER**
1745	

DATE MAILED: 11/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

C

Office Action Summary	Application No.	Applicant(s)	
	09/875,685	ROWEN ET AL.	
	Examiner	Art Unit	
	Mark Ruthkosky	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 August 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *3-5 and 10-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *3-5 and 10-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 3-5 and 10-23 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 23 includes the method limitation of "providing at least two of said flow-field plates in a fuel cell, electrolyser or battery containing a fluid electrolyte, the fluid flow pattern distributes being structured to distribute fuel and oxidant across the plate material." This limitation is indefinite as it is not a step for manufacturing flow field plates. The step of "providing" the plate is not a manufacturing limitation for the method of manufacturing a plate.

Claim Rejections - 35 USC § 102

Claim 22 is rejected under 35 U.S.C. 102(b) as being anticipated by De Haas et al. (US 5,833,516) OR Balko et al. (US 4,339,322) OR Emanuelson et al. (US 4,301,222.)

Claim 22 is a product by process claim. The references teach a flow-field plate (a transport plate) and therefore the claim is anticipated. MPEP 2113 states, "Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a

product of the prior art, the claim is unpatentable even though the prior product was made by a different process."

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 3-5, 10-11, 13-15, and 17-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Balko et al. (US 4,339,322,) in view of De Haas et al. (US 5,833,516) or, alternatively, over De Haas et al. (US 5,833,516), in view of Balko et al. (US 4,339,322.)

The instant claims are to a method for manufacturing flow field plates for use in fuel cells, electrolysers and batteries. The limitation "for use in fuel cells, electrolysers and batteries which contain a fluid electrolyte" has been considered, however, the language is to an intended use of the fluid flow plates and is not given patentable weight. The limitation that "the fluid flow pattern distributes fuel and oxidant across the plate material" has been considered, however, the language is to an intended use of the fluid flow plates and is not given patentable weight. The step of providing at least two fuel cell plates in a fuel cell, electrolyser or battery has been considered, but is not given patentable weight, as it is the intended use of the plate and not a limiting feature for manufacturing flow field plates.

Balko et al. (US 4,339,322,) teaches an electrically conductive, graphite/polymer, current collector/separator flow field plate for fuel cells and electrolysis cells, which is inherently a flow

field plate as it has channels for transporting reactants of a fuel cell or electrolysis cell. The plate is inherently impermeable to hydrogen and oxygen as graphite carbon/polymer plates are well described in the fuel cell art to be impermeable to these gasses. The plates are assembled to form fluid entry and exit areas, which are aligned with stacked plates (figure 1.) The reference teaches forming flow field grooves by pressure molding the material and thus does not teach sandblasting, bead blasting or grit blasting a particulate etchant-resistant patterned mask to provide a fluid flow pattern.

De Haas et al. (US 5,833,516) teaches a method of manufacturing a transport plate comprising a particulate etchant-resistant mask including a pattern design adjacent a plate; a particulate etching the plate using a particulate etchant and a particulate etchant accelerator so that a fluid flow pattern determined by the pattern design is formed on the plate (col. 3, lines 20-65 and claims 1-17.) The blasting materials include various powder particles that are inherently considered to be sand, bead and grit. The accelerator may be particles of various grain sizes, which encompass sand, bead and grit sizes, (col. 2, lines 10-25; col. 5, lines 5-25.) Masking materials may be a photoresist mask, a metal or a synthetic material (col. 3, lines 20-50.) Adhesives for the masking material are noted. Figures 8-9 show two-axis etching of the plate and a raster pattern. The reference does not teach the plate comprises an electrically conductive material.

It would be obvious to one of ordinary skill in the art at the time the invention was made to use the methods taught in De Haas et al. (US 5,833,516) to form the flow field grooves of Balko et al. (US 4,339,322) as one of ordinary skill in the art would recognize that the method of forming a flow plate as taught by DeHaas will provide the same function and result when used to

form channels on a graphite/fiber plate taught in Balko. Graphite/binder plates are well described in the art and the skilled artesian would recognize that this type of plate is easily etched by grit blasting. De Haas et al. (US 5,833,516) teaches manufacturing a transport plate by applying an etchant-resistant mask of a desired pattern adjacent a plate and particulate etching the plate so that a fluid flow pattern determined by the pattern design is formed on the plate. The motivation to combine the prior art references arises from the expectation that the prior art method will perform its expected function to achieve an equivalent result in forming grooves in the graphite/binder separator element of Balko. The artesian would have found the claimed invention to be obvious in light of the teachings of the references.

Claims 3-5, 10-11, 13-15, and 17-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Emanuelson et al. (US 4,301,222) in view of De Haas et al. (US 5,833,516) or, alternatively, over De Haas et al. (US 5,833,516), in view of Emanuelson et al. (US 4,301,222.)

Emanuelson et al. (US 4,301,222) teaches an electrically conductive, graphite/polymer flow field plate for fuel cells, which is inherently a flow field plate as it has channels for transporting reactants of a fuel cell. The plate is impermeable to hydrogen and oxygen as graphite carbon/polymer plates are well described in the reference to be impermeable to these gasses. The plates are assembled to form fluid entry and exit areas, which are aligned with stacked plates in a fuel cell. The reference teaches forming flow field grooves by molding the material and thus does not teach sandblasting, bead blasting or grit blasting a particulate etchant-resistant patterned mask to provide a fluid flow pattern.

De Haas et al. (US 5,833,516) teaches a method of manufacturing a transport plate comprising a particulate etchant-resistant mask including a pattern design adjacent a plate; a particulate etching the plate using a particulate etchant and a particulate etchant accelerator so that a fluid flow pattern determined by the pattern design is formed on the plate (col. 3, lines 20-65 and claims 1-17.) The blasting materials include various powder particles that are inherently considered to be sand, bead and grit. The accelerator may be particles of various grain sizes, which encompass sand, bead and grit sizes, (col. 2, lines 10-25; col. 5, lines 5-25.) Masking materials may be a photoresist mask, a metal or a synthetic material (col. 3, lines 20-50.) Adhesives for the masking material are noted. Figures 8-9 show two-axis etching of the plate and a raster pattern. The reference does not teach the plate comprises an electrically conductive material.

It would be obvious to one of ordinary skill in the art at the time the invention was made to use the methods taught in De Haas et al. (US 5,833,516) to form the flow field grooves of Emanuelson et al. (US 4,301,222) as one of ordinary skill in the art would recognize that the method of forming a flow plate as taught by DeHaas will provide the same function and result when used to form channels on a graphite/fiber plate taught in Emanuelson et al. (US 4,301,222.) Graphite/binder plates are well described in the art and the skilled artesian would recognize that this type of plate is easily etched by grit blasting. De Haas et al. (US 5,833,516) teaches manufacturing a transport plate by applying an etchant-resistant mask of a desired pattern adjacent a plate and particulate etching the plate so that a fluid flow pattern determined by the pattern design is formed on the plate. The motivation to combine the prior art references arises from the expectation that the prior art method will perform its expected function to achieve an

equivalent result in forming grooves in the graphite/binder separator element of Emanuelson et al. (US 4,301,222.) The artesian would have found the claimed invention to be obvious in light of the teachings of the references.

Claim 12 is rejected under 35 U.S.C. 103(a) as being obvious over De Haas et al. (US 5,833,516), in view of Balko et al. (US 4,339,322,) or, alternatively, over Balko et al. (US 4,339,322,) in view of De Haas et al. (US 5,833,516), as previously applied, OR over Emanuelson et al. (US 4,301,222) in view of De Haas et al. (US 5,833,516) or, alternatively, over De Haas et al. (US 5,833,516), in view of Emanuelson et al. (US 4,301,222), as previously applied, and further in view of Tolles (5,738,574.)

The teachings of Balko et al. (US 4,339,322,) in view of De Haas et al. (US 5,833,516) AND Emanuelson et al. (US 4,301,222) in view of De Haas et al. (US 5,833,516) have been noted. De Haas et al. (US 5,833,516) teaches a method of manufacturing a transport plate comprising the steps of positioning a particulate etchant-resistant mask comprising a pattern design adjacent a plate; and particulate etching the plate using a particulate etchant and a particulate etchant accelerator so that a fluid flow pattern determined by the pattern design is formed on the plate as previously noted (col. 3, lines 20-65 and claims 1-17.) The accelerator may be adjusted with regard to the type of abrasive, grain size, etc. (col. 2, lines 15-30.) The reference does not teach silica grit blasting of the material, however, it would be obvious to one of ordinary skill in the art at the time the invention was made to use silica grit as the type of abrasive in order to etch the material. Silica grit is well known in the art to remove a material by pressure as taught by Tolles (5,738,574.) One of ordinary skill in the art would recognize from

the teachings of De Haas et al. and Tolles (5,738,574) that silica grit may be used as a material to blast or etch a substrate as described in Tolles (5,738,574.) Silica grit may be used as an equivalent material in the process taught by De Haas et al., as the silica grit will form transport channels in the same manner as taught by De Haas.

Claim 16 is rejected under 35 U.S.C. 103(a) as being obvious over De Haas et al. (US 5,833,516), in view of Balko et al. (US 4,339,322,) or, alternatively, over Balko et al. (US 4,339,322,) in view of De Haas et al. (US 5,833,516), as previously applied, OR over Emanuelson et al. (US 4,301,222) in view of De Haas et al. (US 5,833,516) or, alternatively, over De Haas et al. (US 5,833,516), in view of Emanuelson et al. (US 4,301,222), as previously applied, and further in view of Kondrats (5,750,190.)

The teachings of Balko et al. (US 4,339,322,) in view of De Haas et al. (US 5,833,516) AND Emanuelson et al. (US 4,301,222) in view of De Haas et al. (US 5,833,516) have been noted. De Haas et al. (US 5,833,516) teaches a method of manufacturing a transport plate comprising the steps of positioning a particulate etchant-resistant mask comprising a pattern design adjacent a plate; and particulate etching the plate using a particulate etchant and a particulate etchant accelerator so that a fluid flow pattern determined by the pattern design is formed on the plate as previously noted (col. 3, lines 20-65 and claims 1-17.) The accelerator may be adjusted with regard to the type of abrasive, grain size, etc. (col. 2, lines 15-30.) The reference does not teach a vinyl polymer as the mask material. However, it would be obvious to one of ordinary skill in the art at the time the invention was made to use a vinyl polymer as the mask in DeHaas, in order to protect the material. Vinyl polymers are well known in the art to

protect or mask a material as taught by Kondrats (5,750,190.) One of ordinary skill in the art would recognize from the teaching of Kondrats (5,750,190) that a vinyl polymer may be used to protect a substrate from etching and blasting as described. From these teachings one of ordinary skill in the art would recognize that a vinyl polymer may be used as a mask material in the process taught by De Haas et al. as the mask will prevent the blasting of sections of the flow field substrate in order to form channels for fluid transport.

Response to Arguments

Applicant's arguments filed 8/18/2006 have been fully considered but they are not persuasive.

With regard to applicant's arguments that the newly added limitations make the invention patentable over the prior art, Claim 23 includes the limitation of "providing at least two of said flow-field plates in a fuel cell, electrolyser or battery containing a fluid electrolyte, the fluid flow pattern distributes being structured to distribute fuel and oxidant across the plate material." This limitation is indefinite as it is not a step for manufacturing flow field plates. The step of "providing" the plate is not a manufacturing limitation for the method of manufacturing a plate. The limitation has been considered, but is not given patentable weight. The step of "providing" the plate is not a manufacturing limitation for the method of manufacturing a plate.

Rejection under 35 U.S.C. 102: With regard to claim 22, the applicant argues that the transport plates of the prior art references are not conductive. With regard to the product claim, the flow field is not defined by the method of making the plate. In DeHaas, the plate is taught to include a layer of conductive material (claims 1, 8, and 9) and fluid flow channels. In response

to applicant's argument that the DeHaas reference does not suggest the distribution of fuel and oxidant, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. The fluids do not further limit the claimed plate. In response to applicant's argument that the DeHaas reference does not suggest the plate is impermeable to hydrogen and oxygen gasses, the plates are taught to be made of glass or ceramic materials and are used in luminescent gas discharge displays and cathode ray tubes. These materials are used to contain gasses in applications that require gasses to function, and therefore, the materials of the reference are inherently impermeable to gasses. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. The prior art structure is capable of performing the intended use of allowing gasses to flow, and therefore it meets the claim.

With regard to applicant's arguments towards Balko et al. (US 4,339,322), the method of making the plate has been addressed in the rejection insomuch as the method does not limit the product, a plate. The applicant argues that the Balko reference teaches that the conductive plates are prepared by pressure molding. The plate is conductive with a fluid flow pattern and thus, the reference teaches all of the limitations of the claimed product, a flow field plate. Balko teaches a bipolar separator used in electrochemical cells for the transport of reactants and products including hydrogen and oxygen (see col. 4, lines 1-63.) From this, it is clear that the plate is impermeable to hydrogen and oxygen.

The Emanuelson reference teaches a separator plate used in fuel cells. The plate is conductive as it is made of graphite and it is used as a current collector to transfer electrons in the fuel cell (col. 1, lines 10-40; col. 4, lines 1-15.) The plates are used to transport hydrogen and oxygen to the respective catalysts of the fuel cell. Further, the plates are specifically taught to be impermeable to hydrogen and oxygen to prevent the mixing of gasses.

Rejection under 35 U.S.C. 103: The applicant argues that the combination of references does not render the claims obvious over the prior art. It is first noted that the limitation "for use in fuel cells, electrolysers and batteries which contain a fluid electrolyte" has been considered, however, the language is to an intended use of the fluid flow plates and is not given patentable weight. Further, the limitation that "the fluid flow pattern distributes fuel and oxidant across the plate material" has been considered, however, the language is to an intended use of the fluid flow plates and is not given patentable weight. Again, the use of reactants in a fuel cell does not further limit the plate or the process of manufacturing a plate. The step of providing at least two fuel cell plates in a fuel cell, electrolyser or battery has been considered, but is not given patentable weight, as it is the intended use of the plate and not a limiting feature for manufacturing flow field plates.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Balko et al. (US 4,339,322,) teaches an electrically conductive, graphite/polymer, current collector/separator flow field plate for electrochemical cells and electrolysis cells, which is inherently a flow field plate as it has

channels for transporting reactants of an electrochemical cell or electrolysis cell. The plate is conductive as it is made of a conductive graphite material and it is used as a current collector having excellent conductivity (col. 1, lines 24-33, and col. 6, lines 10-22.) The plate is inherently impermeable to hydrogen and oxygen as graphite carbon/polymer plates are well described in the fuel cell art to be impermeable to these gasses (for example, see Emanuelson et al. (US 4,301,222) which discloses conductive, impermeable plates of graphite and a binding resin as taught in Balko.) Further, the reference teaches that the plate is used to separate anode and cathode reactants while allowing for the flow of these reactants on opposite sides of the plate (col. 3, lines 20-45 and col. 4, lines 1-25.) Therefore, it is clear that the Balko reference teaches a separator plate that is both conductive and impermeable to hydrogen and oxygen. As noted in the rejection, Emanuelson et al. (US 4,301,222) teaches conductive, impermeable plates of graphite and a binding resin used to transport fuel cell reactants including hydrogen and oxygen.

The DeHaas reference is relied upon for teaching a specific process for etching a plate by blasting the plate that is covered with a blasting resisting mask in order to provide a pattern in the plate. The skilled artesian would recognize that the process of etching a plate as taught in DeHaas would provide an equivalent structure to the molded plate as taught in Balko. In response to applicant's argument that the secondary reference is to an insulating material, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, the references are both in the field of applicant's endeavor, i.e. the blasting of plates to form channels and reasonably pertinent to the

particular problem with which the applicant was concerned including the formation of channels in a fluid distribution plate.

Tolles (5,738,574) is applied to teach that silica grit blasting of a material is well-known in the art, as Tolles teaches the use of silica grit as a type of abrasive in order to etch the material. Silica grit is well known in the art to remove a material by pressure as taught by Tolles (5,738,574.) One of ordinary skill in the art would recognize from the teachings of De Haas et al. and Tolles (5,738,574) that silica grit may be used as a material to blast or etch a substrate as described in Tolles (5,738,574.) Silica grit may be used as an equivalent material in the process taught by De Haas et al., as the silica grit will form transport channels in the same manner as taught by De Haas.

Kondrats (5,750,190) is applied to teach a vinyl polymer used as a mask material in order to protect a material. Vinyl polymers are well known in the art to protect or mask a material as taught by Kondrats (5,750,190.) One of ordinary skill in the art would recognize from the teaching of Kondrats (5,750,190) that a vinyl polymer may be used to protect a substrate from etching and blasting as described. From these teachings one of ordinary skill in the art would recognize that a vinyl polymer may be used as a mask material in the process taught by De Haas et al. as the mask will prevent the blasting of sections of the flow field substrate in order to form channels for fluid transport.

Examiner Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark Ruthkosky whose telephone number is 571-272-1291. The examiner can normally be reached on FLEX schedule (generally, Monday-Thursday from 9:00-6:30.) If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free.)

Mark Ruthkosky
Primary Patent Examiner
Art Unit 1745

10/27/2006